

METHOD OF PROGRAMMING/READING MULTI-LEVEL FLASH MEMORY USING SENSING CIRCUIT

ABSTRACT OF THE DISCLOSURE

5

A method of programming a multi-level flash memory using a sensing circuit according to the present invention performs an automatic verification program method of performing verification while performing a program. The method can reduce the power consumption by detecting a program data stored at a register to stop an operation of the sensing circuit for memory cells for which the program is completed. Also, a method of reading the flash memory senses the state of the threshold voltage of a cell using the sense amplifier used in the program operation while increasing or lowering the voltage applied to a control gate step-by-step and then stores the level value generated in a counter at the registers depending on its state, wherein an operation of the sensing circuit for the memory cells for which the program is completed is stopped. Therefore, the present invention can reduce the power consumption and allow a multi-level read to be implemented on an actual array with a simple sense amplifier structure step-by-step. In addition, the present invention can reduce the power consumption while simplifying the circuit construction by allowing a program/read operation to be simultaneously implemented on a single sense amplifier circuit.